



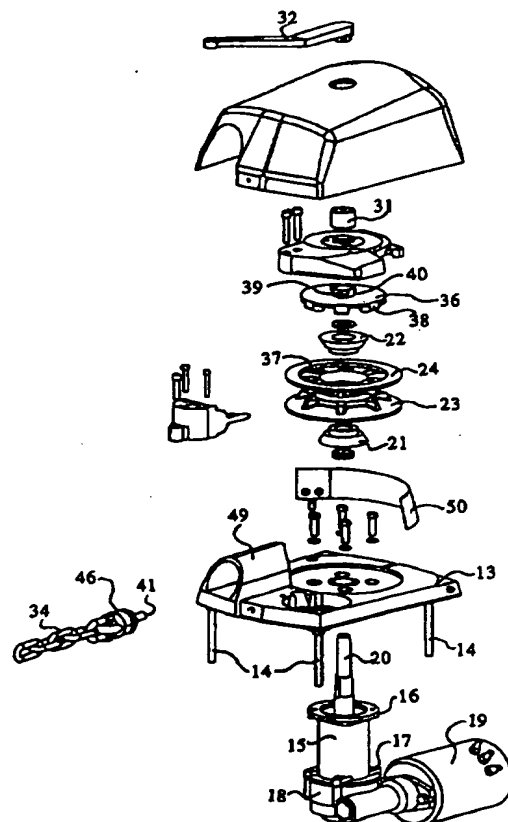
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: A WINCH

## (57) Abstract

A winch (10) capable of hauling a cable comprising a length of rope (41) and a length of chain (34) connected end-to-end especially by a shackle (43), the winch including a drivable rotatable member such as a shaft (20) and a chainwheel (23, 24) adapted to haul the length of chain (34). A rope sheave (26), adapted to haul the length of rope (41), and the chainwheel are connected to the rotatable member, and a sheave disengaging member (36) is actuated by the presence of the chain (34) in the chainwheel (23, 24) to disengage the sheave from the rotatable member.



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**A WINCH**

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**TECHNICAL FIELD OF THE INVENTION**

This invention relates to a winch particularly, but not exclusively, suitable for utilisation with an anchor warp or cable of a pleasure launch, a yacht or similar.

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**OBJECT**

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One object of this invention is to provide a winch which includes both a chainwheel and a rope haul sheave disposed in a cooperating assembly to control the raising and lowering of an anchor warp or cable, and particularly but not exclusively an anchor warp or cable comprising a length of chain and a length of rope joined by a shackle.

**STATEMENTS OF THE INVENTION**

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According to a first aspect of this invention there is provided a winch broadly comprising a body rotatably supporting both a chainwheel and a rope sheave adjacent thereto, means to rotate the sheave and the chainwheel, and a sheave disengaging member actuated by the presence of a chain within the chainwheel to disengage the sheave from the means to rotate the sheave.

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According to a second aspect of this invention there is provided a winch broadly comprising a body rotatably supporting as shaft adapted to be rotated by a prime mover, a chainwheel mounted on and rotatable by the shaft and incorporating a rope sheave activating means, actuated by the presence or absence of a chain within the chainwheel, to be axially displaceable to activate or deactivate, as the case may be, a rope haul sheave also mounted on the shaft adjacent the chainwheel.

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According to a third aspect of this invention there is provided a winch broadly

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comprising a body rotatably supporting a shaft adapted to be rotated by a prime mover, a chainwheel mounted on and rotatable by the shaft and incorporating chain link receiving indents, a rope sheave engaging member bias mounted on the chainwheel and  
5 incorporating extending teeth on a face thereof disposed, under the biasing, to axially protrude through apertures in the chainwheel into the indents thereof, the rope sheave engaging member being axially displaceable as to clear the teeth from the indents and, in such mode, incorporating means to be engageable with a rope haul sheave otherwise  
10 mounted undriven on the shaft adjacent the chainwheel.

According to another aspect of the present invention there is provided a winch capable of hauling a cable comprising a length of rope and a length of chain connected  
15 end-to-end, the winch including a drivable rotatable member characterised by a chainwheel adapted to haul the length of chain and a rope sheave adapted to haul the length of rope, the chain wheel and the sheave being connected to the rotatable member, and a sheave disengaging member actuated by the presence of the chain in the  
20 chainwheel to disengage the sheave from the rotatable member.

Preferably, the chainwheel and sheave are mounted coaxially on the rotatable member

Conveniently the chainwheel is formed with a series of circumferential spaces, into  
25 which parts of said chain can fit, and into at least one of said spaces a part of the disengaging member protrudes, said part being displaced from the space by entry of the chain and said part operating to disengage the sheave.

30 The disengaging member may be coaxial with the chainwheel and the sheave.

Advantageously the chainwheel is formed with a series of passages parallel to the axis thereof, each passage opening into one of said spaces and the disengaging member is  
35 provided with a plurality of said parts thereof, each said part protruding through one of the passages into one of the spaces.

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5 Preferable the disengaging member carries one or more drive elements movable with the disengaging member between a first position in which there is no chain in the chainwheel and the drive element is engaged with a part of the sheave so as to transmit rotation from the rotatable member to the sheave, and a second position in which there is a chain in the chainwheel and the drive element is disengage from said part of the sheave, whereby the sheave is rotationally disconnected from the drive element.

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### BRIEF DESCRIPTION OF THE DRAWINGS

15 One preferred embodiment of the invention is described, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is a side view of a winch according to the invention.

20 Figure 2 is a perspective exploded view of the winch shown in Figure 1,

Figure 3 is a section in a vertical plane through Figure 1, and

25 Figure 4 is a perspective exploded view of part of a cable shown in Figure 2, at enlarged scale.

### DESCRIPTION

30 In the drawings, in a typical boat installation, a deck 10 or structural member thereof, is provided with an aperture 11, through which passes part of an anchor warp winch 12.

35 The winch 12 includes a deck plate 13, which is fastened onto the upper surface of the deck 10 by means of four parallel studs or bolts 14 passing though the deck 10 and fastened by nuts beneath the deck 10.

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5 A bearing housing 15 has integral flanges 16, 17 at the upper and lower ends respectively. The upper flange 16 is fastened to the underside of the deck plate 13 by bolts or studs. The lower flange 17 is fastened by bolts or studs to a right-angle drive worm reduction gearbox 18 of known kind having typically a reduction ratio of around 44:1. A worm gear in the gearbox 18 is driven by an electric motor 19 integral therewith.

10 The motor 19 is conveniently a reversible D.C. 12 volt or 24 volt motor running at around 3000-8000 revolutions per minute.

15 If preferred, other forms of reduction gearbox 18 may be used and other forms of motor 19 can be used, for example a variable speed A.C. motor or a hydraulic or pneumatic motor where sources of pressurised fluid are available.

20 A shaft 20 is carried in bearings in the housing 15 and is connected at the bottom to be driven by a worm wheel meshed with the worm gear in gearbox 18.

25 In view of the high reduction ratio of the worm gearbox 18, as soon as power is cut off from the motor 19, and it comes to rest, the shaft 20 is effectively fixed, since the gearbox 18 is virtually incapable of transmitting a reverse drive from the shaft 20. Lower and upper clutch cones 21, 22 are axially slidable on the shaft 20 and are driven therefrom through a key. Lower and upper chainwheel members 23, 24 are axially and radially located by the clutch cones 21, 22. For this purpose, the chainwheel members 23, 24 are each formed with a co-acting conical face against which the clutch cones 21, 22 can bear. The chainwheel members 23, 24 are interconnected by dowels 30. The top end of the shaft 20 is threaded and carries a clutch nut 31, which can be rotated relative to the shaft 20 by a clutch handle 32. A sleeve 27 on the shaft 20 extends between the clutch nut 31 and the upper clutch cone 22, so that rotation of the handle 32 will cause the nut 31 to compress the sleeve 27 and, thereby causing the clutch cones 21, 22 to grip the chainwheel 23, 24. Thus the shaft 20 and chainwheel 23, 24 are

- 5 -

connected together rotationally.

5 The chainwheel 23, 24 is adapted to provided a positive drive to any chain for which it is designed. Typical anchor chains are shown in Figures 2 and 4 and are of the type in which, under tension, the adjacent links position themselves at right angles to each other. Therefore, the chainwheel 23, 24 is provided with a groove 33 to accommodate an appropriate chain 34. The bottom of the groove 33 is formed with circumferential  
10 spaced detents 25 into which each of the "edge-on" links in the chain 34 will fit. Freely running on the outside of the sleeve 27 there is positioned a sheave 26, having a groove 35 of which opposing faces are ribbed or otherwise textured to provide a strong friction grip on any rope in the groove 35.

15 Driving interconnection between the chainwheel 23, 24 and the rope sheave 26 is provided by an intermediate member 36. As seen in Figure 2 the upper chainwheel member 24 has a plurality of apertures 37 therethrough and the intermediate member 36 has downwardly facing dogs 38 extending through the apertures 37 into the detents 25.  
20 The lower faces of the dogs 38 are sloping, so that as the links of the chain enter the detents 25, the intermediate member 36 is moved upwards. The engagement of the dogs 38 in the apertures 37 causes the intermediate member 36 to be rotated with the upper chainwheel member 24.

25 When a chain is not present in the chainwheel 23, 24, and the intermediate member 36 is in its lowest position, due to gravity, projections 39 on the upper end of the sleeve 40, forming part of the intermediate member 36 engage in circumferential spaced recesses  
30 in the rope sheave 26, thereby connecting the chainwheel 23, 24 via the intermediate member 36 to the rope sheave 26. When a chain is present in the chainwheel 23, 24 and the links of the chain enter the detents 25, the intermediate member 36 is moved upwards, to a position where the projections 39 are free of the recesses in the rope sheave 26, so that drive between the intermediate member 36 and the rope sheave 26  
35 becomes disconnected.

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5 When the winch is to be used for raising and lowering an anchor, the anchor must be of sufficient weight to be self launching. ie to be capable of drawing the rope and chain from a storage locker, through the winch and over any bow guide or roller on the boat. The chain 34 is preferably attached to the anchor by a free swivel at one end, and as shown particularly in Figure 4 one end of the rope 41 is looped tightly around a thimble 42 and then spliced, in the usual manner. A shackle 43 is passed through the thimble 42 and a shackle pin 44 is passed through the shackle 43 and the end link of the chain 34, with a washer 45 each side thereof, the shackle pin 44 being tightened into the shackle 43. The thimble 42 is protected, in use, by a thimble protector 46, which is made of two similar halves each having internal Y-shaped grooves 47 to accommodate the rope 41 and thimble 42. The two halves of the thimble protector are held together by screws 48, the shackle protector 46 is of similar diameter to the maximum width of the shackle 43. It has been found that a three strand twisted nylon or braided nylon rope is satisfactory.

20 When the winch has been installed and the rope and chain joined together and attached to the anchor, the combined rope and chain 41, 34 can be loaded by loosening the clutch nut 31 to allow the chainwheel 23, 24 to rotate freely. The neatly trimmed end of the rope 41 remote from the chain 34 is passed through a guide tunnel 49, which is aligned tangentially to the chainwheel 23, 24. If provided, a guide arm 50 is swung out of the way and the rope 41 is passed around the chainwheel 23, 24 to emerge forwardly. It then passes upwards and around the front of a pillar 51 so as to approach the sheave 26 rearwardly and tangentially. A rope pressure arm 52 is swung away and the rope is fed into the groove 35. The chainwheel 23, 24 is then rotated by hand which will cause the sheave 26 to be rotated therewith, in the absence of the chain 34. The rope is thus drawn round the rear of the sheave 26 to emerge forwardly through a passage 53 in the pillar 51 and down below the deck 10.

35 When the chain 34 reaches the chainwheel 23, 24 the links enter the detents 25 thereby moving the intermediate member 36 upwards and disengaging the drive to the sheave



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5 26. Since the sheave 26 is no longer being driven, when the thimble protector 46 approaches the sheave 26, the thimble protector 46 and adjacent lengths of chain come to rest and the chain emerging from the chainwheel 23, 24 drops as a loop through a large aperture 54 in the deck plate 13 into storage.

The winch 12 is protected by a rigid cover 55, located by spring-loaded plungers 56.

10 Although the invention has been described with the chainwheel 23, 24 and the rope sheave 26 mounted co-axially, if preferred they could be mounted on separate axes, such as parallel axes. Drive between the chainwheel 23, 24 and sheave 26 can be by any suitable means such as chain, gears, belt or the like. Axial movement of the  
15 intermediate member 36 relative to the chainwheel 23, 24 due to the presence of the chain 34 therein can be transmitted by a suitable lever or otherwise to disconnect drive from the chainwheel 23, 24 to the sheave 26.

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**CLAIMS**

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1. A winch capable of hauling a cable comprising a length of rope and a length of chain connected end-to-end, the winch including a drivable rotatable member characterized by a chainwheel adapted to haul the length of chain and a rope sheave adapted to haul the length of rope, the chain wheel and the sheave being
- 10 connected to the rotatable member, and a sheave disengaging member actuated by the presence of the chain in the chainwheel to disengage the sheave from the rotatable member.
- 15
2. A winch as claimed in claim 1 characterised in that the chainwheel and sheave are mounted coaxially on the rotatable member
- 20
3. A winch as claimed in claim 1 or claim 2 characterised in that the chainwheel is formed with a series of circumferential spaces, into which parts of said chain can fit, and into at least one of said spaces a part of the disengaging member protrudes, said part being displaced from the space by entry of the chain and said part operating to disengage the sheave.
- 25
4. A winch as claimed in claim 3 characterised in that the disengaging member is coaxial with the chainwheel and the sheave
- 30
5. A winch as claimed in claim 3 or 4 characterised in that the chainwheel is formed with a series of passages parallel to the axis thereof, each passage opening into one of said space and the disengaging member is provided with a plurality of said parts thereof, each said part protruding through one of the passages into one of the
- 35 spaces.

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- 5 6. A winch as claimed in any preceding claim in which the disengaging member carries one or more drive elements movable with the disengaging member between a first position in which there is no chain in the chainwheel and the drive element is engaged with a part of the sheave so as to transmit rotation from the rotatable member to the sheave, and a second position in which there is a chain in the chainwheel and the drive element is disengage from said part of the sheave, whereby the sheave is rotationally disconnected from the drive element.
- 10 7. A winch as claimed in any preceding claim in which the disengaging member is biased to engage the sheave with the rotatable member.
- 15 8. A winch as claimed in claim 7, characterised in that, in use, the sheave is positioned above the chainwheel and the disengaging member is biased downwards by gravity.
- 20 9. A winch as claimed in any preceding claim, Characterised in that the chainwheel is connected to be driven by the rotatable member by a friction drive means.
- 25 10. A winch as claimed in claim 9, characterised in that the friction drive is optionally releasable so as to disengage the chainwheel from the rotatable member.
- 30 11. A winch constructed and arranged and adapted to operate substantially as described herein and as shown in the accompanying drawings.
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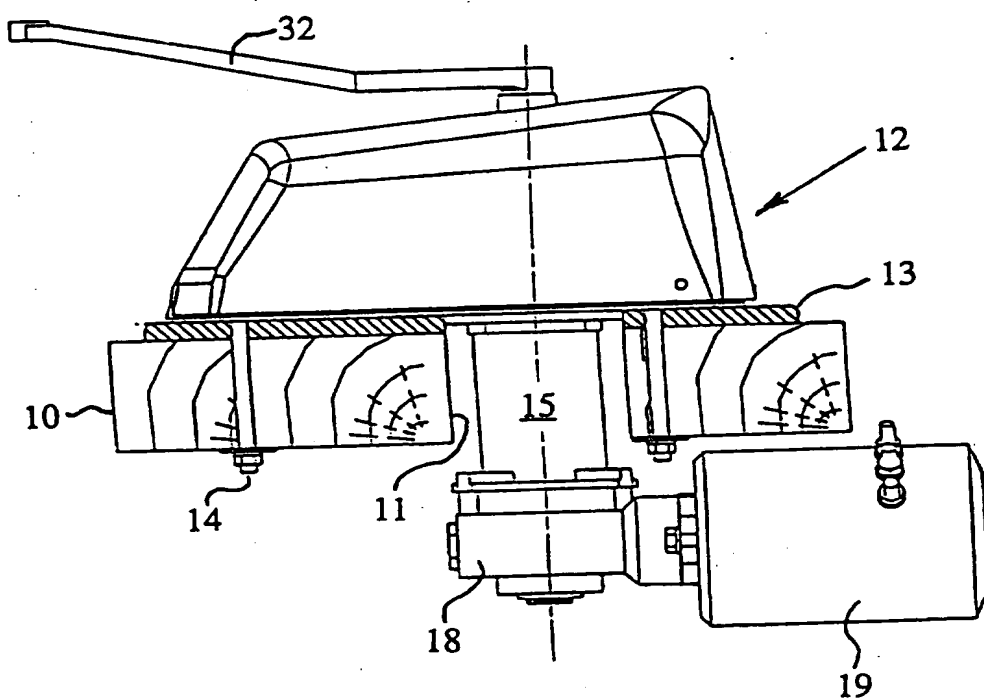


FIG. 1

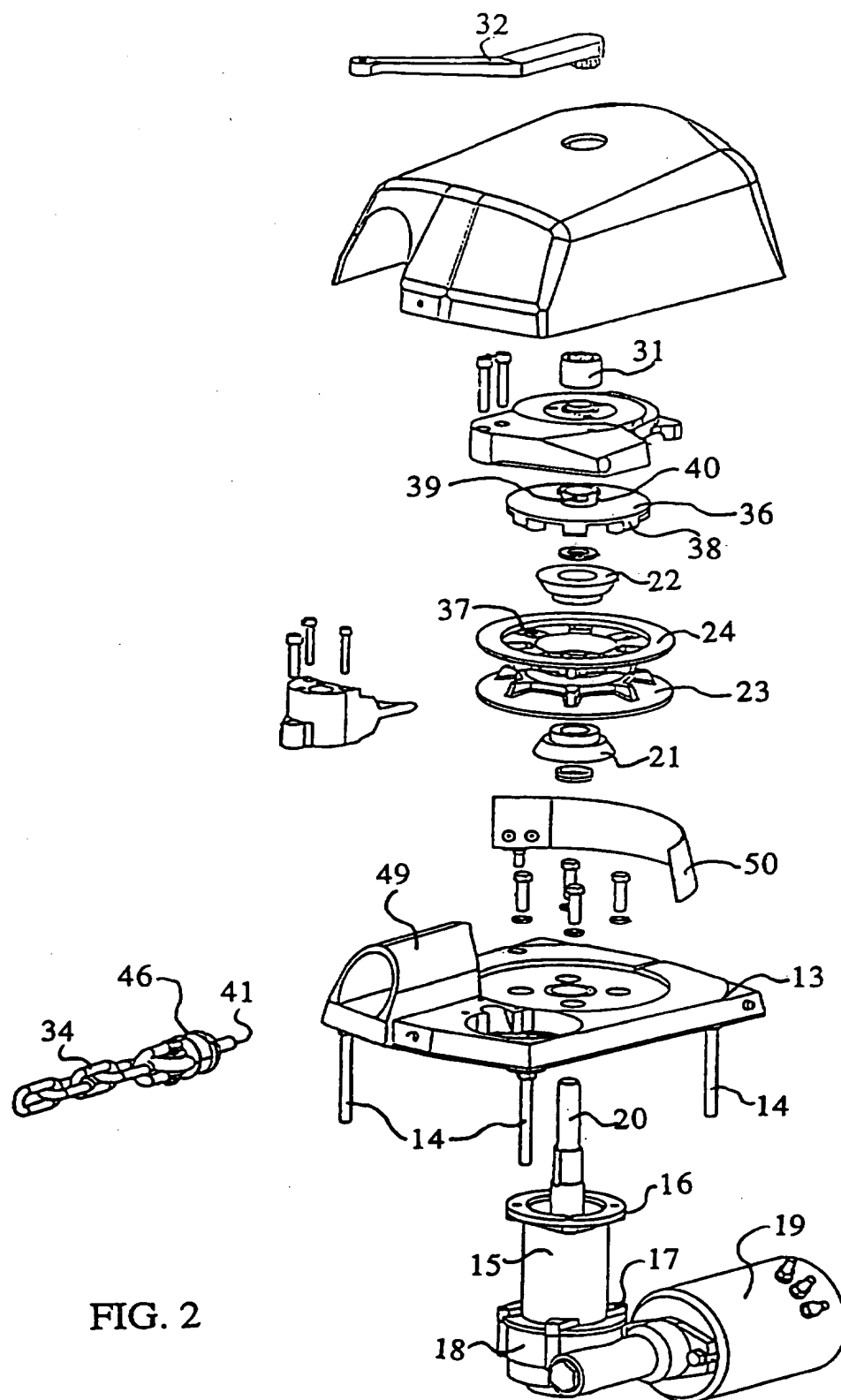
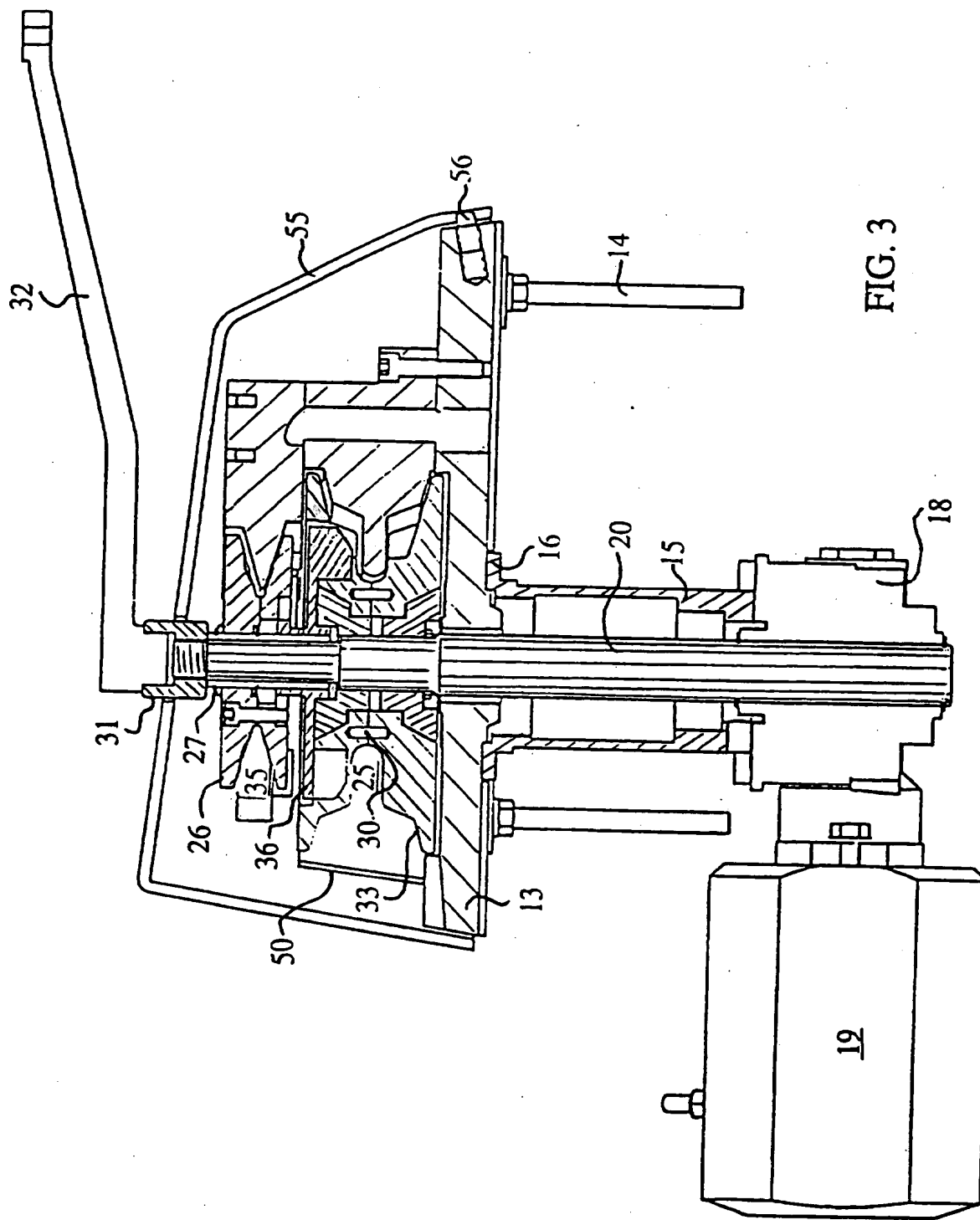


FIG. 2



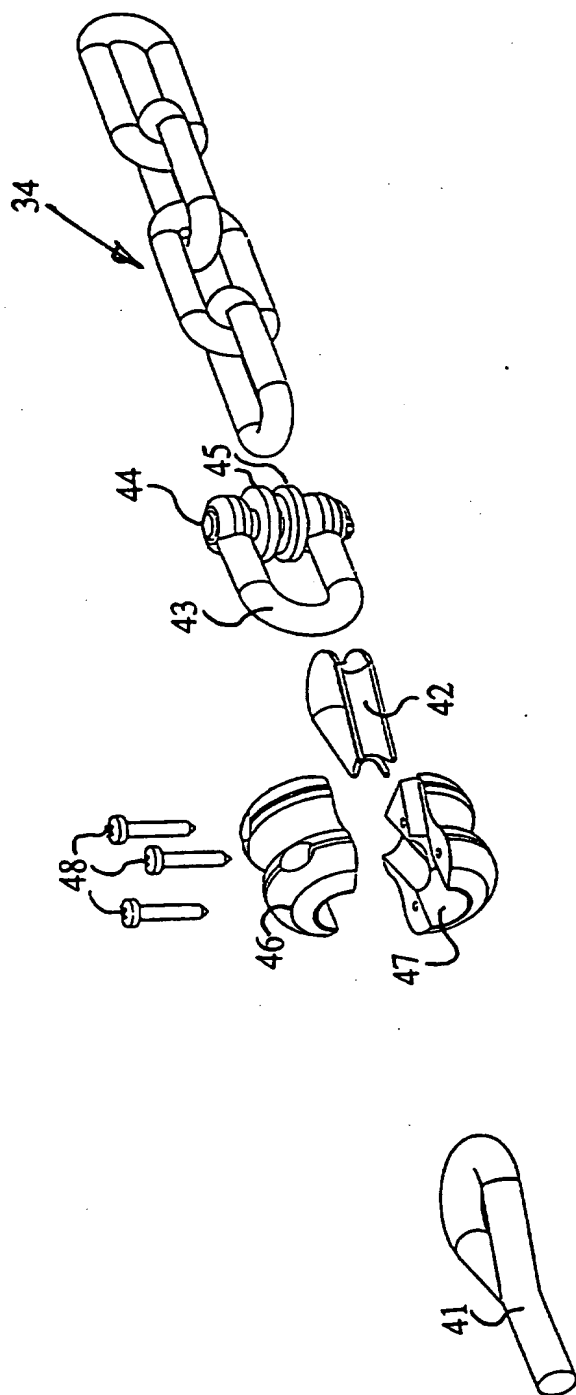


FIG. 4

## INTERNATIONAL SEARCH REPORT

International Application No.

PCT/NZ 95/00101

**A. CLASSIFICATION OF SUBJECT MATTER**Int Cl<sup>6</sup>: B66D 1/26, 1/30

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC B66D 1/26, 1/30,

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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JAPIO:

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2166106 A (JOHN T HEPBURN LTD) 30 April 1986 Whole Document	1,2
A	US 4078768 A (KROGSTAD et al) 14 March 1978 Whole Document	
A	US 4023775 A (BEATTIE) 17 May 1977 Whole Document	



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Date of the actual completion of the international search

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19 January 1996.

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International Application No.

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C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	AU 62129/90 A (NIKKO KIZAI CO LTD) 12 March 1992 Whole Document	
A	GB 2124577 (A/S BERGENS MEKANISKE VERKSTEDER) 22 February 1984 Whole Document	
A	US 5238227 A (WHITE) 24 August 1993 Whole Document	
A	GB 2097886 A (CONTINENTAL EMSCO COMPANY) 10 November 1982 Whole Document	

**INTERNATIONAL SEARCH REPORT**  
**Information on patent family members**

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Patent Document Cited in Search Report				Patent Family Member			
GB	2166106	CA	1240308	GB	8526298	JP	61183095
US	4023775	GB	1488377	NO	752778		
GB	2124577	FI	832761	GB	8319818	JP	59045288
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							END OF ANNEX